



Report to the Committee on Armed  
Services, U.S. Senate

March 1997

# NUCLEAR WEAPONS

## Capabilities of DOE's Limited Life Component Program to Meet Operational Needs



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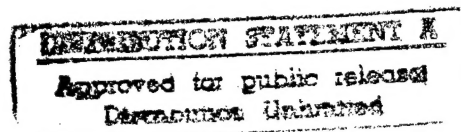
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Resources, Community, and  
Economic Development Division

B-276096

March 5, 1997

The Honorable Strom Thurmond  
Chairman  
The Honorable Carl Levin  
Ranking Minority Member  
Committee on Armed Services  
United States Senate



The Department of Energy (DOE) is responsible for managing the nation's nuclear weapons stockpile, including a limited life components program. That program involves the periodic replacement of four components that have useful operating lives shorter than the expected life of a nuclear weapon. If these components are not replaced within a specified time, the weapon would eventually become inoperative.

The number and type of nuclear weapons to be managed by DOE for the next 11 years are established by the Production and Planning Directive. This directive is based on the Nuclear Weapons Stockpile Memorandum prepared by DOE and the Department of Defense (DOD) and signed by the President. It is used by DOE's Albuquerque Operations Office to develop production requirements, purchase requirements, and shipping schedules for limited life components.

The current directive includes information and requirements for (1) supplying limited life components for weapons in the active stockpile (weapons that are currently operational)<sup>1</sup> and (2) having the capability to provide these components for weapons that are in the inactive stockpile, some of which have been designated as weapons that could be reactivated in the future. The Committee asked us to provide information on DOE's ability to provide limited life components for nuclear weapons in the current active stockpile and the extent to which the components can be supplied to weapons reactivated from the inactive stockpile.

## Results in Brief

DOE appears to be capable of providing limited life components for nuclear weapons in the nation's active stockpile, as long as the size of the stockpile does not significantly increase. DOE currently does not have enough production capacity for certain key components if weapons from

<sup>1</sup>Our discussion of the active stockpile includes a small number of weapons in the inactive stockpile that are designated as replacements for weapons withdrawn from the active stockpile for quality assurance tests. We included these weapons because DOE routinely replaces limited life components in these weapons.

the inactive stockpile are reactivated. DOE's Albuquerque Operations Office has developed plans to expand production capacity of these key components. This expansion, if completed on time, will allow DOE to meet the Production and Planning Directive's requirements by providing the capacity to support weapons that may be reactivated. Initially, DOE considered delaying the expansions by not funding them in fiscal year 1997. However, in October 1996, DOE directed its Albuquerque Operations Office to make the expansions high-priority activities and to fund them during fiscal year 1997.

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## DOE's Capability to Provide Limited Life Components

The four different types of components that DOE considers to have limited lives are gas generators, electrical power sources, tritium reservoirs, and neutron generators. Over the past few years, DOE has made major changes in how limited life components are acquired. Production facilities have been moved to new locations, and old locations have been closed. Despite this transition, DOE appears capable of meeting requirements for providing limited life components for weapons in the active stockpile. However, with the current production capacity, neutron generators and tritium reservoirs cannot be provided for some weapons that could be reactivated. DOE has plans to acquire the necessary capacity in time to service these weapons should they be recalled to the active stockpile.

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### Gas Generators

Gas generators—pressure-generating devices that deploy parachutes in some types of nuclear weapons—last about 20 years before needing to be replaced. As in the past, DOE will purchase gas generators, which are not classified components, from commercial sources. DOE appears capable of supplying gas generators in sufficient quantities to service all nuclear weapons requiring them.

According to DOE officials, only one type of nuclear weapon in the active stockpile uses a gas generator. DOE has enough new gas generators in inventory to conduct scheduled replacements until the end of fiscal year 1998. DOE also has some gas generators taken from retired weapons that still have several years of useful life. Using these generators would allow DOE to meet its scheduled replacements through the end of fiscal year 2000. To supply future gas generators, DOE's Sandia National Laboratories will continue to purchase from the same company it has been using—Pacific Scientific. According to DOE and Pacific Scientific officials, the commercial supplier has more than sufficient capacity to provide for DOE's projected needs for gas generators. In addition, DOE officials believe

that, if needed, gas generators could be obtained from several other commercial sources. As a result, it appears that over the next several years DOE will not have a problem supplying gas generators for active weapons.

In addition, gas generators for weapons that may be reactivated should not be a problem. Only one weapon that may be reactivated contains a gas generator. DOE and Pacific Scientific officials told us that the commercial supplier has sufficient capacity to provide these gas generators and needs only a 12- to 18-month lead time to provide new gas generators.

DOE's Sandia National Laboratories is currently studying a new propellant for use in the gas generators. The old propellant is the part of the gas generator that has the limited life. If the new propellant is successfully developed, DOE will eventually replace all gas generators currently contained in nuclear weapons with generators containing the new propellant, which does not have a limited life.

## Electrical Power Sources

Radioisotopic thermoelectric generators (RTG) are devices that use heat from a radioactive material to provide electrical power for nuclear weapons. In the past, DOE manufactured RTGs at its Los Alamos, New Mexico; Pinellas, Florida; and Mound, Ohio facilities. Although Los Alamos retains the capability to manufacture new RTGs, DOE has no plans to do so. DOE believes that supplying RTGs or alternative power sources will not be a problem for active or reactivated weapons for the next few years because it plans to obtain alternative power sources commercially.

The Production and Planning Directive requires DOE to provide replacement power sources for the one type of weapon in the active stockpile that uses a RTG. While DOE has not recently needed to replace RTGs, it plans to begin replacing them with commercially available batteries in about 2001. To have batteries available at that time, DOE intends to begin the acquisition process in February 1998.

DOE officials told us that if batteries are not available in 1999 or 2000, the Department will replace the expired RTGs with ones currently in inventory. The RTGs in inventory were manufactured years ago for use in weapons that never were built. Even though these RTGs have never been used, they will need to be replaced within 5 or 6 years because of their age. DOE has enough RTGs in inventory to support requirements until about 2004. At that time, they will need to have commercially produced batteries available. No weapons currently scheduled for possible reactivation have RTGs.

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Sandia National Laboratories is currently conducting a study of RTGs, their projected design life, and replacement requirements. This study could result in extending RTG life, thus delaying the need for replacements. The results of the study are expected in February 1998.

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## Tritium Reservoirs

Tritium reservoirs are stainless steel vessels designed to contain tritium in a nuclear weapon.<sup>2</sup> The reservoir must be removed from a weapon periodically and replaced with one containing fresh tritium because the tritium decays at a rate of 5.5 percent per year and thus loses its effectiveness. Once a reservoir is loaded with tritium, not only does the tritium start to decay, but the tritium reservoir also starts to deteriorate. As a result, a reservoir can be refilled only a limited number of times (depending on the design of the reservoir) before it has to be replaced. Tritium reservoirs had been manufactured at DOE's Rocky Flats Plant near Denver, Colorado, but in 1993, DOE transferred the mission to its facility in Kansas City, Missouri. DOE appears capable of providing tritium reservoirs for active weapons for the next several years. However, DOE will not be able to provide tritium reservoirs for reactivation weapons unless current capacity is doubled. DOE continually needs to replace tritium reservoirs. To provide reservoirs during the movement of operations from Rocky Flats to Kansas City, DOE had Rocky Flats preproduce reservoirs. DOE's Kansas City facility began producing reservoirs in 1995 and, in September 1996, the first Kansas City-made reservoir was approved for use. Kansas City is now in full production mode. This mode will allow DOE to service active weapons according to current requirements contained in the Production and Planning Directive.

The production capacity currently available at Kansas City is not sufficient to service reactivated weapons. DOE studies have concluded that Kansas City will need to substantially increase its production capacity and preproduce some reservoirs to meet possible requirements for reactivated weapons. DOE estimates that the expansion will have total costs of about \$9.4 million. It will be completed in fiscal year 2000. DOE officials believe that completing this expansion on time will allow them to meet the Production and Planning Directive's requirements by providing the capacity to service inactive weapons that may be reactivated.

In May and June 1996, DOE's Office of the Assistant Secretary for Defense Programs considered delaying this expansion by not funding the activity in the fiscal year 1997 budget. On September 16, 1996, the Albuquerque

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<sup>2</sup>Tritium is a gaseous radioactive isotope that is used to enhance the power of nuclear weapons.



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Operations Office wrote to the Deputy Assistant Secretary for Military Applications and Stockpile Management, pointing out the conflict between the budget and the Production and Planning Directive's requirement that DOE be prepared to provide reactivation weapons with limited life components. On October 18, 1996, the Deputy Assistant Secretary sent a memorandum to Albuquerque stating that DOE was committed to the activity and directing that Albuquerque reallocate funds to support the expansion. According to DOE Defense Programs officials, the expansion of tritium reservoir production is now considered one of the highest priorities for the Albuquerque Operations Office.

Finally, the Savannah River plant, where the reservoirs are filled, has sufficient capacity to meet requirements for active and reactivated weapons. The Replacement Tritium Facility is a relatively new building which was completed in 1993 at a cost of \$413 million. The facility was sized to support a considerably larger nuclear weapons stockpile than exists today. Although DOE has sufficient capacity, it will have to convert an existing tritium loading line to enable it to handle a new type of reservoir. This conversion, which will not be needed until at least 2002, will cost about \$250,000.

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## Neutron Generators

Neutron generators are timing devices that provide triggering pulses for nuclear weapons. Neutron generators had been produced by DOE's plant in Pinellas, Florida. In 1993, the Department closed the Pinellas plant and transferred production to Los Alamos and Sandia. It now appears that Los Alamos and Sandia will be able to meet the current requirements for servicing active weapons. These requirements should be met if the facilities begin production on schedule and, in some cases, preproduce some neutron generators. DOE will not, however, be able to provide neutron generators for reactivated weapons unless current production capacity is doubled.

DOE will not need to supply new neutron generators for nuclear weapons until 2000 or 2001. Preparations for production at Los Alamos and Sandia are currently on schedule and, if production begins on schedule in 1999, DOE should be able to provide neutron generators for active weapons for the next several years. However, DOE will not be able to meet the requirements for neutron generators in reactivated weapons with the current planned capacity. As a result, the Albuquerque Operations Office developed plans to nearly double the production capability at Sandia and Los Alamos. This expansion is expected to have total costs of about

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\$17.8 million. It will be completed in fiscal year 2000. DOE officials believe that completing this expansion on time will allow them to meet the Production and Planning Directive's requirements by providing the capacity to service inactive weapons that may be reactivated.

As with tritium reservoirs, DOE's Office of the Assistant Secretary for Defense Programs initially considered not funding the expansion in the fiscal year 1997 budget. However, on October 18, 1996, DOE instructed that the expansion be funded. DOE headquarters officials informed us that expansion of DOE's capability to manufacture neutron generators is now also one of the Albuquerque Operations Office's highest priorities.

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## Observations

DOE's program to provide limited life components for the nation's nuclear weapons is a critical part of stockpile maintenance. If limited life components are not or cannot be replaced on schedule, the reliability of the weapons could be adversely affected—even to the point of some weapons becoming nonoperational. It appears that DOE will be able to service active weapons for the next several years, assuming that (1) commercial vendors can supply gas generators and (2) DOE completes research on the operational life of RTGs and battery design studies and finds a suitable commercial battery vendor. However, DOE does not currently have the required capability to provide tritium reservoirs and neutron generators for weapons in the inactive stockpile that may be reactivated. While initially unfunded, projects to expand production have recently been placed on a high priority. In our view, on the basis of the number of nuclear weapons planned for the current and future stockpile, DOE's continued commitment to these expansion plans for the limited life component program is essential if the nuclear weapons stockpile is to be maintained in accordance with the existing Production and Planning Directive.

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## Agency Comments and Our Evaluation

We provided a draft of this report to DOE for its review and comment. We met with officials from DOE's Office of Military Applications and Stockpile Management and its Albuquerque Operations Office, who agreed with the contents of this report. The full text of DOE's comments is included as appendix I.

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## Scope and Methodology

Our objectives were to provide information on DOE's ability to provide limited life components for nuclear weapons in the current active

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stockpile and the extent to which the components can be supplied to weapons reactivated from the inactive stockpile. To determine if DOE could provide limited life components for nuclear weapons, we obtained schedules showing the requirements for replacing limited life components and compared those requirements with DOE's production capabilities and planned production schedules. We discussed this data with DOE officials responsible for the limited life component program, with representatives of the contractors that operate DOE's limited life component production facilities, and with the company that supplies gas generators to DOE. We conducted our review from November 1996 through January 1997 in accordance with generally accepted government auditing standards.

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As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this report until 10 days after the date of this report. At that time, we will send copies of the report to the Secretary of Energy; the Secretary of Defense; and the Director, Office of Management and Budget. We will also make copies available to others on request.

If you or your staff have any questions about this report, please call me at (202) 512-3841. Major contributors to this report include William F. Fenzel, Assistant Director; Kenneth E. Lightner Jr., Evaluator; and William M. Seay, Evaluator.



Allen Li  
Associate Director, Energy, Resources,  
and Science Issues



# Comments From the Department of Energy



**Department of Energy**  
Washington, DC 20585

February 21, 1997

Mr. Allen Li  
Associate Director, Energy,  
Resources, and Science Issues  
U. S. General Accounting Office  
441 G Street, NW  
Room 2440  
Washington, D.C. 20548

Dear Mr. Li:

Thank you for the opportunity to review and comment on your draft report entitled "NUCLEAR WEAPONS: Capabilities of DOE's Limited Life Component Program to Meet Operational Needs." The Office of Nuclear Weapons Management (DP-22) concurs with your report's assessment of Defense Programs capabilities to provide limited life components for the nuclear weapons stockpile. We have no further comments.

If you have any questions or require further assistance in connection with our response, please contact Joseph J. Gazda at (301) 903-2984.

Sincerely,

A handwritten signature in cursive script, reading "Richard D. Hahn", is positioned above the typed name.

Richard D. Hahn  
Director, Office of Nuclear  
Weapons Management  
Defense Programs

cc:  
J. Gazda, DP-22  
J. Hobbs, DP-44  
K. Lightner, GAO